40-565A 2Amp BRIC™ 2nd Generation PXI Switching 3U PXI Multi Slot Matrix Module

- Integrated PXI 2Amp Matrix Module With Built In High Performance Screened Analog Bus
- Maximum Current 2A Hot or Cold Switching
- 2-Pole Switching up to 200VDC/140VAC and up to 60W Max Power
- BRIC4 - High Density With Up To 768 Relays Per 4-Slot Module
- BRIC8 - High Density With Up To 1536 Relays Per 8-Slot Module
- Load Just The Number Of Daughter Switch Cards You Need For Your Application
- Custom Versions Available
- 3ms Operate/Release Time
- Automatic Analog Bus Isolation Switching Gives >25MHz Bandwidth
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty
- Built-In Diagnostics - BIRST™

BIRST
Built-In Relay Self-Test

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals - specifically signals <100µV - here Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560/561/562 range.

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-565A PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps at 200VDC/140VAC The 40-565A BRIC modules are available in 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using quality electro-mechanical relays for high switching confidence.

Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-565A PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of much lower cost 8 or 14-slot PXI chassis.

- **BRIC4** is a 4-slot PXI Module, this can hold up to 4 matrix daughtercards, 768 crosspoints.
- **BRIC8** is an 8-slot PXI Module, which can hold up to 8 matrix daughtercards, 1536 crosspoints.

PXI 2 Amp Matrix BRIC Range Description	
40-565A (2-Pole Matrix)	
BRIC4	Up to 96x8
BRIC8	Up to 192x8
Further BRIC Modules are in development or planned for both 3U and 6U platforms, including custom versions.	

High Reliability and Easy of Use

The 40-565A PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application and the tool will run a diagnostic test that will find all crosspoint and backplane isolation relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools build into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, chances are the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained in the BRIC user manual.

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40-565A BRIC Key Advantages

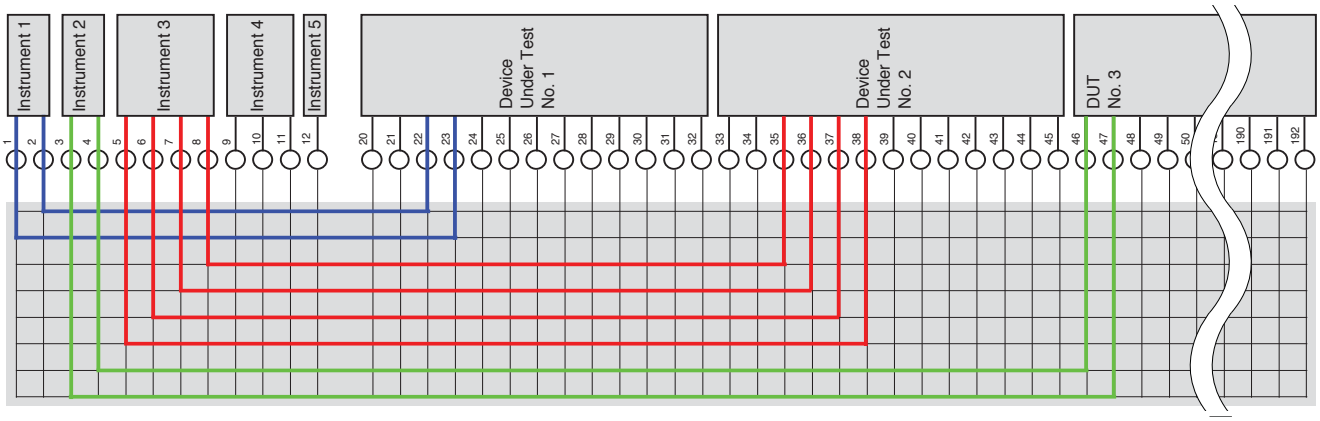
- ✔ Complete PXI Switching Solution in one PXI Module.
- ✔ Simplified cabling, easy to connect to the DUT thus minimizing costs.
- ✔ Internal Shielded Analog Bus giving maximum signal integrity with easy expansion at minimal cost with maximum bandwidth and isolation.
- ✔ Program as one whole matrix, so very easy to achieve fast operate time.
- ✔ Targeted at high performance matrix switching with minimized cost.
- ✔ Build just the matrix configuration you need. Modular architecture allows users to buy just as much matrix capacity as they require, expansion cards can be added later.
- ✔ BRICs allow use of much lower cost 8 or 14 slot PXI chassis (such as 40-908 or 40-914).
- ✔ Simpler and faster programming with Direct I/O, VISA and IVI Drivers + LabView Soft Front Panels. Fully compatible with NI Switch Executive.
- ✔ Built-in BIRST™ self-test.
- ✔ Custom versions built to order.

Performance & Cost Comparison With Competing Platforms for a Typical 192x8 Matrix (2-pole switching)

		Pickering PXI 2Amp BRIC	**VXI Industry Density**	**SCXI Highest Density**
192 x 8 Matrix, 2 Pole	Matrix Model Used	40-565A-102-192x8	6 units (32x8 Matrix)	6 x units (32x8 Matrix)
	Overall Matrix Size	**192x8** (1536 crosspoints)	192x8 (1536 crosspoints)	192x8 (1536 crosspoints)
	Analog Bus	Yes	No	Yes
	No of Slots	8-Slot 3U PXI Module	6 Slots of 6U VXI	6 Slots of 4U SCXI
	Use Low Cost Chassis?	Yes (8 or 14-slot)	No	No
	Operate Time	3ms	2ms	4ms
	Max Volts	200VDC/140VAC	200VDC	150VDC/150VAC
	Max Current/Power	2A, 60W	1A, 30W	1A, 30W
	Bandwidth	25MHz	<2MHz	<5MHz
	Relay Lifetime	10^8	10^7	$5x10^7$
	Relay Type	Electro-mechanical Relay	Electro-mechanical Relay	Electro-mechanical Relay
	Relative Cost	**<40%**	100%	75%

† Relative Costs are for switching cards only, so additional chassis, cabling, etc have not been included.

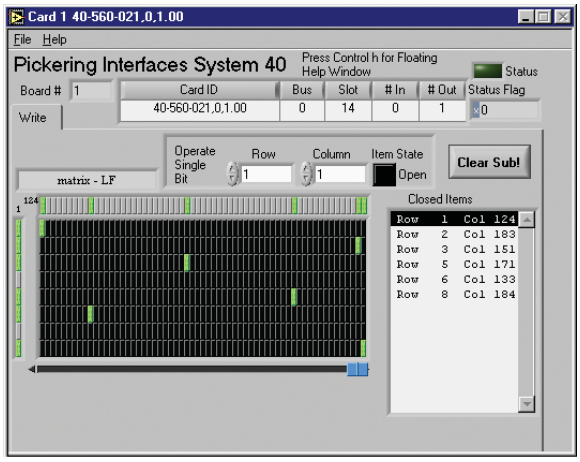
Example Configurations of the 40-565A 2 Amp BRIC Matrix



Schematic diagram showing a 192 x 8 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.

Connectors and Cabling Options for PXI BRIC Modules

Pickering Interfaces offer a complete range PXI Connectors and Prototyping Cable for the 78 Way D-Type connector used on the 40-565A, providing a means of connecting your U.U.T. to a Pickering Interfaces BRIC module. Wire as large as 28 gauge can be used and with the ample cable exit at the back of the connector backshell, rapid accurate custom cabling is assured.



Pickering Interfaces PXI Matrix Soft Front Panel

PXI BRIC Software Drivers

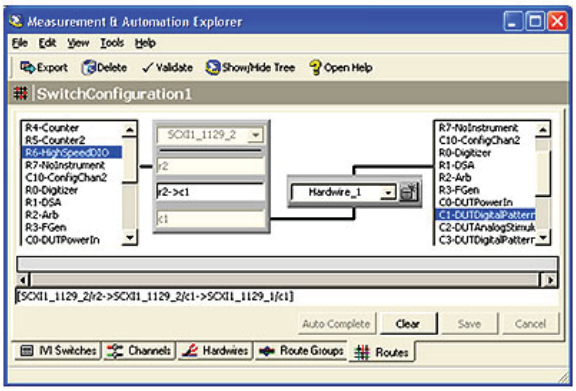
The PXI BRIC uses the standard software drivers used by all Pickering Interfaces PXI switch modules, these are supplied with Windows XP/Vista/7 drivers - freely available from our web site www.pickeringtest.com, also available are code examples in LabWindows/CVI, Visual Basic, Visual C++ and Borland C++.

All modules also have comprehensive IVI, VISA and DLL (Direct I/O) support together with Soft Front Panels, source code for LabView VI's, Diagnostic utillities and HTML Help, all of which which may also be downloaded direcd from our web site.

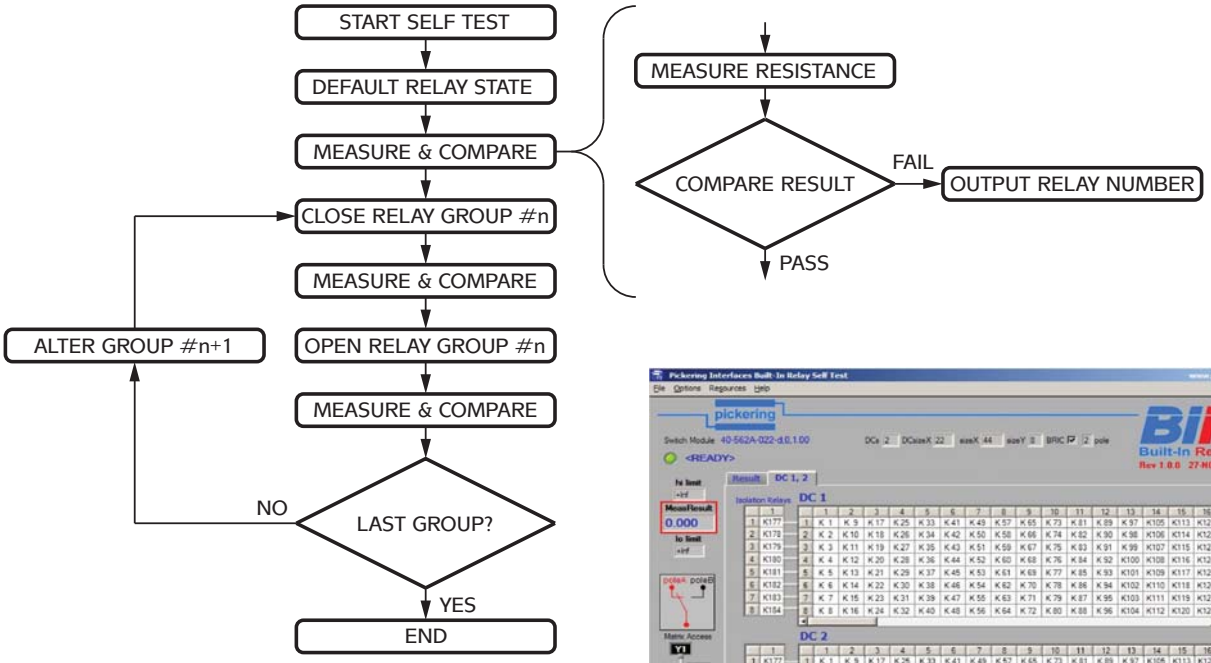
Pickering PXI modules are compatible with NI's Measurement & Automation Explorer.

NI Switch Executive Support

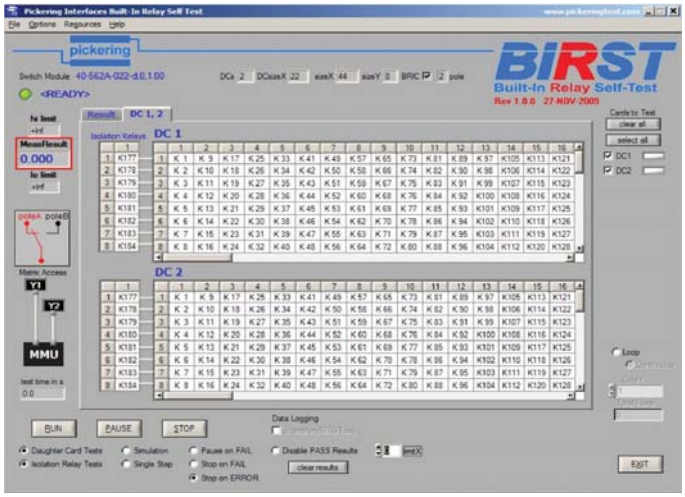
National Instrument's Switch Executive (NISE) is a switch management software package designed to simplify the control of switching systems. Pickering Interfaces provides an IVI-C compliant switch driver for all BRIC's, allowing the product to be integrated into a test system using NISE.



BUILT IN RELAY SELF TEST - BIRST™



BIRST™ Flow Chart



Test Sequencer Front Panel for BIRST™. This allows any combination of tests to be run in either single or multiple sequences. All test data is displayed in the results window and can be written to a data file.

It can be hard to confirm or identify faulty relays on complex switching matrices. The user may be aware that the test system is not behaving as expected but may be unsure if it is a cabling fault, a software problem or a faulty matrix. Discovering the source of the problem takes time and effort users may not have when working to tight schedules.

To ensure low cost of ownership, Pickering Interfaces has now incorporated a test tool, BIRST™, into the BRIC™.

BIRST™

The BIRST™ is a sophisticated diagnostic tool, which allows a complete relay self test of a BRIC™ module. The BIRST™ is an easy to use, tool that is especially useful in remote production sites where local technical support may be limited. It provides the following features and capabilities:

- Complete BRIC™, Matrix self-test capability
- High fault coverage, self-test tool
- Tests for all relay fault types (bad open or bad close)
- Identifies faults to individual component relay level
- Test sequencer allows detailed control of testing
- Test results shown on screen or sent to log file
- Runs single or repeat tests for maximum confidence

Designed for Reliability and Serviceability

The BIRST™ provides a quick and cost effective way of identifying the fault or simply providing reassurance that the matrix is working correctly.

The design of Pickering Interfaces' products ensures that relay replacement can be accomplished with a minimum of investment in tools. The use of leaded relays in preference to surface mounted relays ensures that the replacement of one device will not stress other devices through the use of re-flow techniques. Individual relay failures can be corrected with little impact on the other relays in the module. This maximizes the service life of the matrix even after a failure has occurred and been repaired.

The repairer's skills required are confined to a good understanding of the extraction and replacement of leaded components. Spare relays are included with many of Pickering's lower density matrix modules. Alternatively replacement parts are readily available from Pickering Interfaces representatives. The ability to replace failures locally ensures that system downtime is minimized and transportation costs are avoided.

Switching Specification (40-565A)

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	200VDC/140VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance	
On (Single Module):	<1Ω (X-Y connection)
Off (Single Module):	$>10^9\Omega$
Minimum Voltage:	100µV
Differential Thermal Offset:	<10µV
Operate Times	
Crosspoint Relay:	<3ms
Crosspoint & Isolation Relay:	<6ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

Typical Bandwidth and Crosstalk

Typical Bandwidth For Fully Loaded 192x8 Matrix (40-565A-102-192x8)	25MHz
Crosstalk for 40-565A-102-192x8 @1MHz	-55dB

Maximum Crosspoint Count

The 40-565A has a suggested maximum number of simultaneously operated crosspoints of 50 per BRIC4 or 100 per BRIC8, please contact factory if more information is required.

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A (typ 1A)	0	0

Mechanical Characteristics

Four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Weight

BRIC4 empty module	0.9Kg
BRIC4 fully loaded	2.1Kg
BRIC8 empty module	1.6Kg
BRIC8 fully loaded	4.0Kg
BRIC daughter card	0.2Kg

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals are carried via multiple front panel 78-Way male D-Type connectors (Up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

40-565 BRIC Matrix Product Order Codes

BRIC4 - 4 Slot High Density 2 Pole Matrix	**40-565A-002**
BRIC8 - 8 Slot High Density 2 Pole Matrix	**40-565A-102**

When ordering 40-565A modules the matrix configuration **must** be specified, this includes the prefix code together with the configuration code, see 40-565A configuration tables for specific details.

x8 Configuration Options	BRIC4 40-565A-002	BRIC8 40-565A-102
24x8 Matrix	**-24x8**	**-24x8**
48x8 Matrix	**-48x8**	**-48x8**
72x8 Matrix	**-72x8**	**-72x8**
96x8 Matrix	**-96x8**	**-96x8**
120x8 Matrix		**-120x8**
144x8 Matrix		**-144x8**
168x8 Matrix		**-168x8**
192x8 Matrix		**-192x8**

Upgrading With Daughtercards

BRIC modules can be upgraded to a larger matrix size using daughtercards, please consult your local sales office for further information.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-565A range is as follows:

91-100-001 kit for 40-565A-002/102

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-565A module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Programming

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with 32/64-bit versions of Windows including XP, Vista, 7 and 8 operating systems. The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering.

These drivers may be used with a variety of programming environments and applications including:

- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Agilent** VEE
- **Mathworks** Matlab
- **Geotest** ATE Easy
- **MTQ Testsolutions** Tecap

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses 33MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

PXI & LXI Chassis Compatibility

Compatible with all chassis conforming to the 3U PXI and 3U cPCI specification. Compatible with Legacy and Hybrid peripheral slots in a 3U PXI Express chassis.

Compatible with Pickering Interfaces LXI Modular Switching chassis. For information on driving your switching solution in an LXI environment refer to the LXI Product Guide.

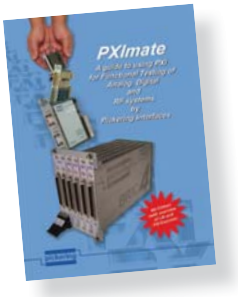
Latest Details

Please refer to our Web Site for Latest Product Details.

www.pickeringtest.com

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download. Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

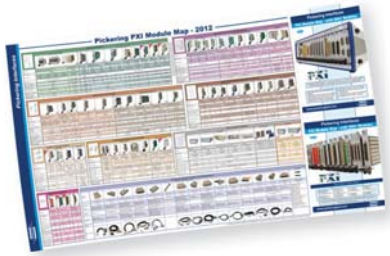
"**The Big PXI Catalog**" gives full details of Pickering's entire range of PXI switch modules, instrument modules and support products.
At over 500 pages, the Big PXI Catalog is available on request or can be downloaded from the Pickering website.



Ever wondered what PXI is all about?

Pickering Interfaces' "**PXImate**" explains the basics of PXI and provides useful data for engineers working on switch based test systems.

The PXImate is available free on request from the Pickering website.



The "**PXI Module Map**" - a simple fold-out selection guide to all Pickering's 600+ PXI Modules.

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Pickering Built-In Relay Self Test: BIRST™

Relays have specific voltage and current ratings and can be damaged if these parameters are exceeded – this can happen accidentally during test development and debug. The damaged relays can exhibit a variety of failures including:

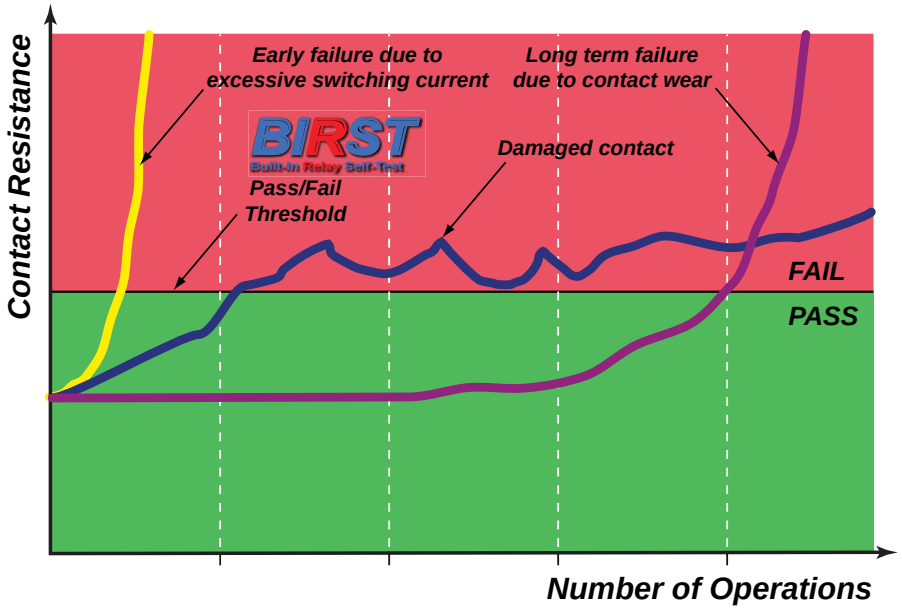
- Permanent or intermittent open/short circuits
- Variable path resistance.

These are often very difficult to diagnose as they can erroneously connect signals together causing unpredictable UUT behaviour.

Historically, complex switching systems on platforms such as VXI and Pickering's System 10/20 GPIB products have included a degree of self test for the relays. But in PXI, the industry has not included self test on switching because of the compromises introduced on density and cost when implementing previous self test architectures. As an alternative, some PXI switching solutions include relay operation counters to attempt to predict when a relay will fail. Although it may be helpful to know how intensively a relay might be being used it is not on its own a good indicator. The disadvantages are:

- Load conditions alone can impact the relay operating life by more than three orders of magnitude.
- Using the measure as a predictive maintenance tool (replacing relays when they have operated a number of times) can easily degrade the reliability of a switching system because of the disturbance that relay replacement causes to adjacent devices (not just relays), the risk of introducing a relay with "infant mortality" and even the potential for damaging the PCB when the change is made, especially if the relays are surface mount devices.

Pickering has greatly improved the test methodology to the extent it is now possible to include full self test in PXI switch modules with minimal impact on cost and switching density, welcome news for users who are used to having such features in their solutions. BIRST will identify any relay failures in the switch module and is also capable of detecting relays with deteriorating contacts which may indicate they are in the process of failing, as shown below.



To conduct a test the user simply disconnects the switching module from the UUT and test instrumentation and runs the supplied application program. No supporting test equipment is needed; the test runs automatically and identifies any defective or suspect relays within the module. If the switch module is connected directly to a Mass Interconnect receiver then BIRST may be executed without removing these connections. The BIRST tool is not intended to entirely displace user-developed self test applications that are built into some ATE systems. This system level test typically uses an external DMM and loop back mechanisms to check for switching and cable harness faults. BIRST conducts its test when the UUT and instrumentation are disconnected from the switching system, if BIRST finds no switching faults and a system level tool does find faults, the problem is with the cabling system. The user does not have to design software to diagnose switching faults, considerably simplifying the design task for system self test.